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A REVIEW ON ROLE AND BENEFITS OF DIGITALIZATION IN PRINTING INDUSTRY

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Abstract: The Workflow of the digital systems is becoming applied in a wide range to improve productivity in the printing industry. The Digital workflow systems developed by market leading companies meet this novel demand. All these advantages and opportunities make these systems a reality. The Digitalization provides the significant role and benefits to the printing industry. So, the objective of this paper is to draw attention to the process design solutions applied in print industry, to introduce and analyze digital workflow systems and to provide information on relevant standards and operational background.

Keywords: Digital Printing, Workflow, Flexographic printing, Electronic Design.

1.0 Introduction

The printing industry in India is a growing industry. Printing, means of producing the written material or images in multiple copies. There are four traditional types of printing: relief printing, intaglio, lithography, and screen process printing. Relief printing encompasses type, stereotype, electrotype, and letterpress.

Digital printing refers to techniques of printing from a digital-based representation directly to a diversity of media. It usually refers to professional printing where small-run jobs from desktop publishing and other digital sources are printed. The cost of the Digital printing is very higher than the per page cost of the more traditional offset printing methods, but this price is usually offset by avoiding the cost of all the technical steps required to make printing plates. Digital Printing also allows for tiny turnaround time, on-demand printing and even a alteration of the image used for each impression. The Digital printing provides the savings in labor and the ever-increasing capability of digital presses means that digital printing is getting the point where it can match or succeed offset printing technologies ability to produce larger print runs of several thousand sheets at a low price.

The biggest difference between digital printing and the traditional printing methods is that there is no need to substitute printing plates in digital printing, whereas in traditional printing the plates are frequently replaced. This results in quicker turnaround time and lower cost when using digital printing, but typically a loss of some fine-image detail by most commercial digital printing processes. The most popular methods include inkjet or laser printers that deposit pigment or toner onto a wide variety of substrates including paper, photo paper, canvas, glass, metal, marble, and other substances [2].

Digital printing has many advantages over traditional methods. Some applications of note include:

- Desktop publishing – It is an inexpensive home and office printing is only possible because of digital processes that avoid the need for printing plates.
- Variable data printing – It uses database-driven print files for the heap personalization of printed materials
- Fine art –the digital printing methods include real photo paper revelation prints and prints on watercolor paper using pigment based inks.
- Print on Demand – The digital printing is used for personalized printing for example, children's books customized with a child's name, photo books or any other books.

- Advertising –It is often used for outdoor banner advertising and event signage, in trade shows, in the retail sector at point of sale or point of purchase, and in personalized direct mail campaigns.
- Photos – digital printing has revolutionized photo printing in terms of the ability to retouch and color correct a photograph before printing.
- Architectural Design – new media that conforms to a variety of surfaces has enabled interior and exterior spaces to be transformed using digitally printed wall murals and floor graphics.
- Computer aided design and production is integrated to Computer Integrated Manufacturing (CIM). The final objective of CIM is a totally automated unit of a whole factory without human labor force. In theory this objective is conceivable, but maybe in the far future, according to experiments. Nowadays highly automated production development with restricted human interaction seems to be cost effective.
- The production of printed products has increasingly changed from a craftsmen's trade into industrial production. As in other industrial sectors, computer-integrated manufacturing is becoming important. During the development of prepress processes, but were soon replaced by the expression: workflow. In the past decades press manufacturer companies developed control software systems that can cooperate with management information systems (MIS) beyond controlling printing presses. The disadvantage of these systems is the lack of flexibility, for the MIS have to now all individual workflow solutions, which may introduce compatibility errors [1].

2.0 Role of Print Production Workflows

2.1 Digital Workflow

There are more solutions to control production processes, one of these is the workflow. The workflow is a sequence of tasks assembled to accomplish a certain objective. Production processes implemented through a workflow need the support of the information system to ensure that the instruction or message is delivered to the addressed party immediately.

Networking can be implemented through external or internet as well. The progress of the process can be traced by control staff. This feedback enables schedule correction on the fly.

Advantages of using workflow systems:

- rapid or automated ignition of repetitive tasks,
- administrative tasks are partly automated and faster,
- verification of the job is fast and accurate through visual and textual report,
- long distances between locations are no problem, connection is easy,
- distant jobs can be integrated into groups,
- customers and partners may also trace the flow,
- Standardized communication channels are used [4].

2.2 Print Production Workflow

The Printing houses act as a production units, that have a complex structure, control of the workflow is quite a challenge for experts, even though is can be divided to three areas. The achievement of this

harmony can be supported by an effective workflow system. The Process control in print industry includes the organization of the production process from the idea through printing to the end-product.

2.3 Development of the Digital Workflow in the Print Production Process

Digital workflow in the print industry was based exclusively on analog data until the 1970s. The digitalization of the offset workflow has consisted of five stages.

At first, color scanners and phototypesetting systems were used to digitize. Drum scanners read the originals electronically, carry out the color corrections and color separations in the processing unit, and record the result on film. The text, image, and graphics were thus available in a digital form [5].

At second, the digitalization of data in the 1980s, with the introduction of Desktop Publishing (DTP). This technology is based on powerful informatics principle. DTP permits the compiling of text, image, and graphics elements digitally into complete pages using layout programs and the outputting of these by laser imaging units on film.

Already shortly after the introducing DTP is becoming available a new method and software: the digital sheet assembly. These software utilities permitted the imposition of pages, the assembly of print sheets and their exposition on print format-size films. It was called Computer to Film (CTF).

The digitalization of prepress ends with Computer to Plate (CTP). The information is directly transferred to the printing plate from the digital sheet assembly without generating any film. One of its technology is when by laser imaging unit are made the printing elements directly on the printing plate in a special plate image setter. The other use of CTP is that plate making is directly included in the printing press.

The last stage is a Computer Integrated Manufacturing (CIM). The transfer of production-relevant data from prepress and the work preparation for make-ready and control of printing and finishing systems and shipping processing play a vital role in introducing CIM in the printing industry. The purpose of this development is to achieve a networked printing house [1, 3].

3.0 Benefits of Digital Printing

In the recent past, more and more people have turned to digital printing for their large format needs. This method of printing has taken the world by storm due to its many advantages that typically outweigh other forms of printing. Compared to other methods, digital printing provides high-quality, low-quantity economical options for its clients.

This method of printing comes with many benefits that will help solve a variety of challenges:

3.1 Cost- **T**he cost of digital printing is typically lower than traditional methods. With most other methods like offset printing, there is extensive preparation to print the image using film plates or photo chemicals, requiring extra setup fees. In addition to this, for stocked substrates there are low to no minimum orders, allowing local, small businesses to enhance their brand without breaking the depository.

3.2 Easily Changed– Digital printing allows changes and manipulations to designs to happen rather quickly. If a sample is printed and the image not satisfactory, it can be changed with minimal effort. Digital data is easily stored and updated, so designs can have different variances between each print.

3.3 Consistency- With other types of printing like screen or offset printing, there is always the chance of variances between each print. With digital printing, the prints are precise and consistent. This is due to the fact that the image is digitally stored and not handled, eliminating human error.

3.4 Variety-Digital printers with UV inks allow for printing on a variety of substrates. Almost anything that will fit in the printer can be printed from wood and glass to board and PVC, digital printing allows for a product that will suit anyone's needs.

3.5 Fast-Unlike other methods of printing where there is extensive set-up and preparation, digital printing is fast and accurate. There are no pre-press stages between the digital file and the final print, speeding up the process. Work is typically not rejected due to short notice and we can usually print on demand.

3.6 Digital printing reduces and prevents waste

While digital printing still requires the use of paper materials, it typically uses much less paper than traditional printing. The Flexographic printers have time-consuming setups and steady running waste, often higher than 15%. That means that for every order of labels produced, 15% more is just thrown in the trash. Since digital equipment doesn't require setups, and uses electronic charges to place ink, scrap is often lower than 5%. Just switching printing techniques can eliminate 10% of paper waste, and that's a conservative estimate. Some printers may also use recycled paper, which cuts down waste even further.

3.7 Proofs can be sent and approved electronically.

In the earlier days, if you needed a press proof, it meant that a job had to be set up, plates had to be made, paper strung through the press, printed on, and then cut down to size. All of this for a few copies of your label. Now, through the magic of Adobe and similar programs, you can get a pretty good idea of what your final product will look like without any printing at all. PDF workflows are the norm, and totally paperless. That being said, there are still times press proofs are necessary. A spot color, special material, or special finish should be proofed to ensure they meet design expectations. The work done in the digital printing press is very easy to do without any steady wastage. So, this type of printing is very much successful than the flexographic printing.

3.8 Digital printing uses fewer toxic chemicals.

The flexographic printing takes a lot of toxic chemicals to produce a printed piece. It need dark room chemicals to produce plates, which themselves are polyester or rubber. In addition to all of these harmful byproducts, you also have to deal with the solvents necessary to remove ink from the rollers. Though digital printing still uses some chemicals, it does need some mild solvents to remove ink and the ink itself is oil based, it uses significantly less than older technologies.

The impact of the digital printing is very positive on environment, it reduces the physical and chemical waste that was prevalent in conventional printing. So if cost-effectiveness, high quality, and reliability are important to you, add one more benefit to your list of reasons to choose digital printing – it's an eco-friendly solution.
Digital printing is the new technique of production that makes prints from electronic files. It involves your artwork being created on a computer and then printed directly onto the material of your choice. Digital printing is an alternative to traditional methods such as lithography, flexography, gravure, letter press, and others – it eliminates many of the mechanical steps required for conventional printing, such as making films and color proofs, manually stripping the pieces together, and making plates.
With the method of digital printing, an image is sent directly to the printer using digital files in PDF, TIFF, PSD or other formats. Digital printing is best used for items that require high amounts of detail and

smaller quantity orders. In Digital printing, there are no pre-press stages but it only contains the digital document files and the final product; there is also no need for messy formatting equipment like film plates or photo chemicals.
Digital prints should come out perfectly when the following stages of production are done accurately.

- The file is prepared with a clean and sharp image in a high enough resolution for the print's size requirements.
- Crop marks and bleed are added as needed. Crop marks are lines on the corner of the print job. After trimming the bleed, crop marks ensure that no unprinted edges occur in the final trimmed document.
- The next stage is imposition – ensuring that as much of the area of the paper as possible is used for the print in order to make the job efficient and cut down on paper waste.
- Before being sent to the printer, your electronic document file (the image or text that you are printing) will need to be converted to a BMP, TIFF, GIF, or JPEG file format. These are known as raster image files or bitmaps. Depending on the software used, PDF files can also be used to print from.

9.0 Why Digital Printing?

Digital printing is a new paradigm for the industry. It provides more choices, features and flexibility than older methods such as offset or flexographic printing. Today, we expect printed materials to be accurate and up to date – clients need printers to be able to produce cost effective, high quality, short run color printing in the fastest possible time frame. However, it is not always easy to decide which process will best suit your job, so before you choose how to print your design, there are a few things you should consider.

10.0 Advantages

Below is a guide to help you understand the advantages of digital printing.

10.1 High Quality: This offers impressive quality and consistency over the other options. The colors show up perfectly on the prints and there are no issues with harsh lines. With digital printing, the quality of the last card, brochure or flyer in a batch is same as that of the first.
10.2 Timeliness: There are fewer steps in the printing process, and as a result, the final product can be delivered quicker.
10.3 Cost Effective: Because printing plates are not required, there is less investment involved to set up a single job.
10.4 Short Runs: Digital printing is the ideal method of producing short to medium print runs compared to traditional methods.
10.5 Customization: The solution provided by the Digital printing is very much affordable to customize marketing materials, direct mail pieces and letters, business cards, and etc.

11.0 Conclusion: There is no reason not to choose digital printing for low quantity, high quality, economical print marketing. Now I can conclude that in Printing Industry one part of the workflow is based on digital data and there are many benefits of Digitization in printing industry. But the electronics – with above mentioned – first are used for measurement and process control.

Complete digitization and integration of prepress, press, and post press is unavoidable if computer-integrated manufacture of printed products is to be achieved. Close to one-third of the printing companies have JDF is needed for the integration of the complete process. But there are two main obstacles to its implementation. At the moment, in printing companies partially incompatible systems and interfaces still exist and there is only a limited supply of machines and computers that can be electronically controlled.

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